REMARKS

Claims 1-29 are pending in this application. Claims 11-22 are withdrawn from consideration. By this Amendment, claims 1, 3-5, 7, 8, 13, 14 and 27 are amended. Support for the amended claims can be found, for example, at page 3, lines 4-25 and page 18, lines 4-15. No new matter is added.

The courtesies extended to Applicants' representative by Examiner Cole at the interview held July 31, 2008, are appreciated. The reasons presented at the interview as warranting favorable action are incorporated into the remarks below and constitute Applicants' record of the interview.

I. Withdrawn Claims

As a preliminary matter, Applicants note that the previous two Office Action asserts that only claims 1-10 and 23-29 are pending. However, this is incorrect. Claims 11-22 stand withdrawn, but were never canceled by Applicants. As such, correction in the next Office Action is requested to reflect that all 29 claims are pending.

Furthermore, in accordance with MPEP 821.04, if product claims are elected and subsequently allowed, rejoinder of non-elected process claims that depend from or otherwise include all of the limitations of allowed product claims is permitted. Withdrawn claim 11 includes all the features of claim 1. Thus, upon allowance of claim 1, rejoinder of claim 11 as well as claims 12-22 dependent therefrom is requested.

II. The Claims Define Allowable Subject Matter

The Office Action rejects claims 1-10 and 23-29 under 35 U.S.C. §103(a) over U.S. Patent No. 6,203,814 to Fisher in view of U.S. Patent No. 5,844,523 to Brennan. This rejection is respectfully traversed.

A. Assertions of the Office Action

Claims 1 and 27 recites "a carbon fiber composite material comprising an elastomer and a carbon nanofiber substantially uniformly dispersed in the elastomer" (emphasis added). The Office Action acknowledges that Fisher does not explicitly disclose this feature. However, the Office Action asserts that

> "Fisher teaches that the functionalized carbon fibrils are better dispersed into polymer systems, including elastomers...because the modified properties of the fibrils are more compatible with the polymer...therefore, Fisher is teaching that dispersion of the fibrils is a result effective variable [which] is related to the surface properties of the modified fibrils and/or the compatibility of the matrix polymer with the functional groups."

Claims 1 and 27 also recite that "the composite material has a first spin-spin relaxation time (T2n) of 100 to 3,000 μsec and a second spin-spin relaxation time (T2nn) of being absent or 1,000 to 10,000 μsec, and a fraction (fnn) of components having the second spin-spin relaxation time of less than 0.2." The Office Action asserts that because "the same materials are employed and the same results are obtained, it is reasonable to presume that the materials of Fisher would have the claimed spin-spin relaxation time."

In other words, the Office Action is asserting that Fisher discloses that uniform dispersion of carbon fibers into the elastomer is a desired outcome and that Fisher discloses using the same materials. As such, the Office Action asserts that one of ordinary skill in the art would have been able to follow the "guidelines" set down by Fisher and, through routine experimentation, optimize these materials (i.e. determine the needed spin-spin relaxations times needed) to achieve substantially uniform dispersion.

However, the rejection lacks merit for several reasons. First, as shown in the attached Declaration of Mr. Toru Naguchi the claimed invention fulfilled a long felt, but unmet need.

Second, the Office Action identifies multiple variables which affect carbon fiber dispersion, thus negating any assertion that any one of these variables is "result effective." Third, as shown in the previously submitted Certified Experiment Report ("the Report") the method and materials of Fisher do not result uniform carbon fiber dispersion.

B. The Claimed Invention Meets a Long Felt, But Unmet Need

MPEP §2144.05(III) states that a prima facie case of obviousness can be rebutted if the Applicant can demonstrate that the invention fulfilled a long felt, but unmet need. As discussed above, and during the July 31 Interview, the Office Action is effectively arguing that Fisher identified (1) a need for uniform dispersion and (2) a roadmap for achieving it. As such, the Office Action argues that it would have been obvious to one of ordinary skill in the art to follow that roadmap and achieve the claimed material.

However, as stated in the attached Declaration of Toru Noguchi it was known in the field that uniform dispersion was a desired goal. In the past to achieve high performance of a carbon fiber composite material it was necessary to mix large quantities of expensive carbon nanofiber into the elastomer. As such, those in the field sought a method to achieve more uniform dispersion of the nanofibers, so that fewer expensive carbon nanofibers would be needed to achieve desired performance. Yet despite this, those in the field were unable to achieve uniform dispersion of carbon nanofibers in a matrix material.

Instead, the inventors were the first people to achieve uniform dispersion of carbon nanofibers in a matrix material. As evidence of the previous inability of the field to achieve this goal, and that the claimed material met a long fely, but unmet need, Mr. Noguchi makes the following points in his Declaration. First, the present disclosure was published and received to great acclaim and fanfare and several different academic conferences. Second, Prof. Morinobu Endo, a world authority on carbon nanofibers, highly praised the novelty and effectiveness of the material. Third, Mr. Naguchi, was offered (and accepted) a visiting

professorship at National Shinshu University in large part based on his work on the instant application. Fourth, the Japanese Ministry of Economy, Trade and Industry praised the claimed invention and its novelty, and now funds research to further research and exploit the claimed material. Fifth, the Japanese Patent Office granted a patent on the claimed invention.

C. Dispersion of Fibrils is Not a Result Effective Variable

As noted above, and as discussed during the July 31 interview, the Office Action asserts that dispersion of fibrils is a result effective variable which is related to the surface properties of the modified fibrils and/or the compatibility of the matrix polymer with the functional groups.

However, MPEP 2144.05(II)(B) states that "a particular parameter must first be recognized as a result-effective variable, i.e. a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation." As such, a result effective variable must be a single parameter, which can be easily optimized through routine experimentation. For example, the treatment capacity of a water tank depending on the ratio of the contractor area and the volume of the water tank. See *In re Antonie*, 559 F.2d 618 (CCPA 1977).

In this case, the Office Action identifies two highly different variables that allegedly affect dispersal of the fibrils. First, the surface properties of the fibrils themselves and second, the compatibility of the matrix polymer with the functional groups. These two variables are unrelated and highly disparate. As such, one of ordinary skill in the art would have to test every possible combination surface properties with every possible combination of functional groups, to achieve the desired goal. Applicants respectfully assert this goes beyond the allowable level of routine experimentation needed to optimize the variable.

D. The Method of Fisher Does Not Result in Uniform Carbon Fiber Dispersion

Fisher discloses that, "polymer systems...bond directly to the fibrils making the fibrils *easier* to disperse with improved adherence" (emphasis added). See column 7, lines 10-18. However, Fisher is merely indicating that certain qualities make it *easier* to disperse the carbon fibers. This in no way discloses or suggests substantially uniform dispersion.

Furthermore, as shown in the previously submitted Certified Experiment Report ("the Report") the method and materials of Fisher do not result in uniform carbon nanofiber dispersion. As such, the Office Action's assertion that because the same materials are employed the same results will be achieved lacks merit.

E. The Recited Spin-Spin Relaxation Times Are Not Inherent to the Materials

As noted above, and as discussed during the July 31 interview, the recited spin-spin relaxation times are not merely inherent to the disclosed materials. As discussed in the instant specification, the inventors through significant experimentation discovered that if the elastomer is selected to have the proper spin-spin relaxation time, and then carbon nanofibers having the proper properties are mixed in with the proper degree of shear force, the carbon fibers will uniformly disperse. This uniform dispersion, in turn, results in a final material having a spin-spin relaxation time that is measurable, but lower than the original elastomer. See Table 1 of the Specification and page 28, line 1 to page 29, line 11.

The Office Action asserts that because Fisher discloses that "the same materials are employed and the same results are obtained, it is reasonable to presume that the materials of Fisher would have the claimed spin-spin relaxation time."

However, as discussed on page 29 of the specification, if excessive amounts of carbon nanofiber are mixed into the elastomer, the final product will not have a measureable spin-spin relaxation time. Therefore, as shown in Table 1, using the same materials improperly will not inherently result in the recited spin-spin relaxation times.

Claims 1 and 27 recite that the material must have both uniform carbon nanofiber dispersion and the recited spin-spin relaxation times. However, as shown in the results of Table 1, without uniform dispersion one will likely not achieve a final material having the recited spin-spin relaxation times from the disclosed starting materials. As such, there is no presumption that the use of the same starting materials will result in the final product having these features.

As such, it is improper to suggest that it would be reasonable to presume this feature is present in Fisher, as asserted in the Office Action.

F. Potential §112 Issue

During the July 31 interview, the Examiner asserted that upon re-inspection of the instant application she was concerned that the specification did not adequately explain how to prepare an elastomer having the required spin-spin relaxation times, or how the elastomer would be tested prior to manufacturing the final product.

Specifically, the Examiner asserted that the specification stated that using an elastomer having the proper spin-spin relaxation time was critical. However, the Examiner asserted that the specification did not adequately address how to manufacture or obtain an elastomer having the proper spin-spin relaxation time and how extensively a sample of elastomer needed to be tested prior to manufacturing the final product.

In response, Applicants make the following points. First, as a preliminary matter Applicants respectfully point out that the Examiner is placing a serious, and unnecessary, burden on the Applicants. The recited spin-spin relaxation times have been in the claims during the examination preceding the last three Office Actions. As such, the Examiner had numerous opportunities to raise this issue earlier, so that Applicants could have addressed these issues in a more cost effective manner.

Second, the specification details a testing method (the Han-echo method) for determining the spin-spin relaxation time. Applicants respectfully assert that the specification does not need to provide details on how to obtain or manufacture a raw component of a recited final product. The specification merely needs to disclose the exact nature and properties of the required raw material. Page 7, lines 5-21 of the instant specification, for example, discloses the nature and properties of the needed raw materials, such as the elastomers. Furthermore, many existing elastomers fulfill the disclosed properties. As such, the specification conveys to one of ordinary skill in the art the nature of the claimed material.

G. Brennan Fails To Cure the Deficiencies of Fisher

Additionally, Brennan fails to disclose substantially uniform dispersion of fibrils, or cure the deficiencies of Fisher. As such, the combination of Fisher and Brennan fails to disclose or suggest the features of claims 1 and 27.

H. Claims 7 and 8

Finally, independent claims 7 and 8 also recite uniform dispersion and the aforementioned spin-spin relaxation times. As such, the applied references also fail to disclose the features of these claims as well. Thus, withdrawal of the rejection of claims 1, 7, 8 and 27, and claims 2-6, 9, 10 and 23-29 depending therefrom, is respectfully requested.

III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of the claims are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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JAO:MKW/jfb

Attachments:
Request for Continued Examination
Petition for Extension of Time
Declaration of Toru Noguchi

Date: August 25, 2008

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